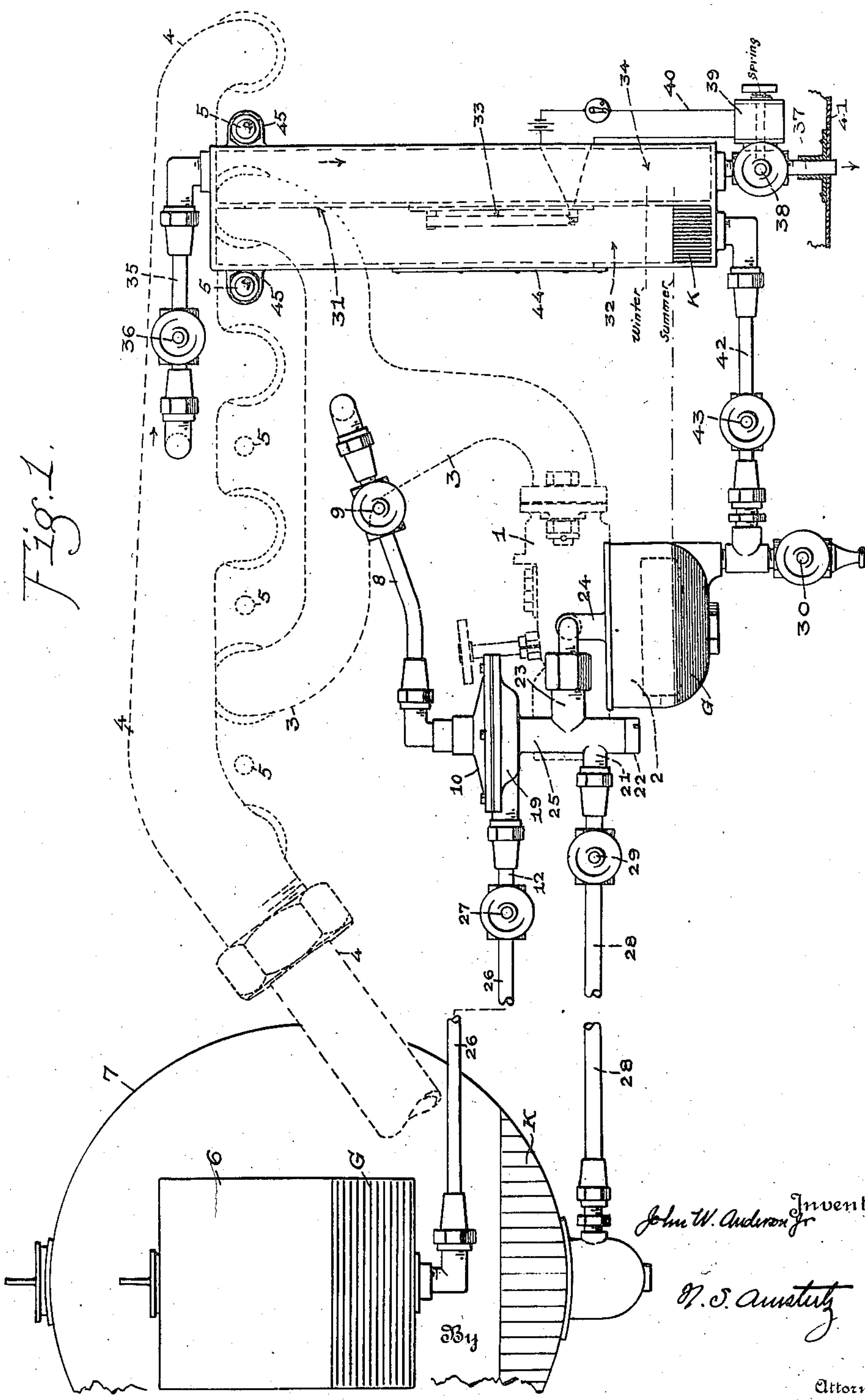
April 15, 1924. **1,490,192**

J. W. ANDERSON, JR

SYSTEM OF AUTOMATIC FUEL AND MOTOR CONTROL

Filed March 1, 1918 2 Sheets-Sheet 1



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2 Sheets-Sheet 2

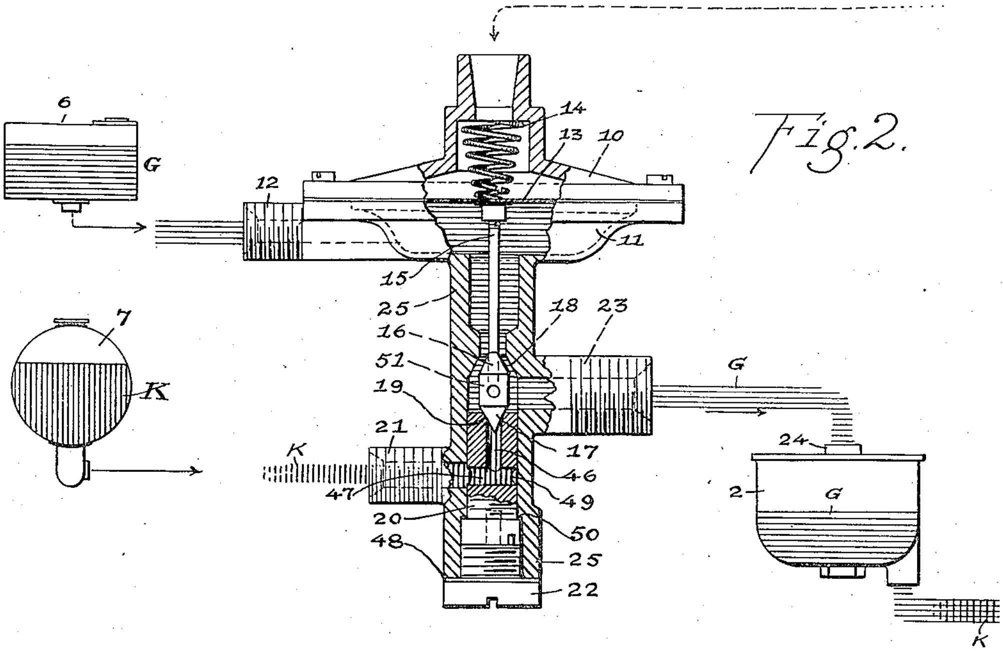

Fig. 2.

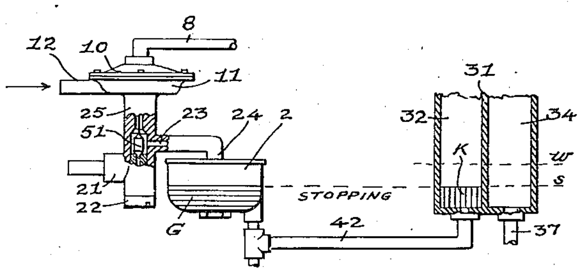

Fig. 3.

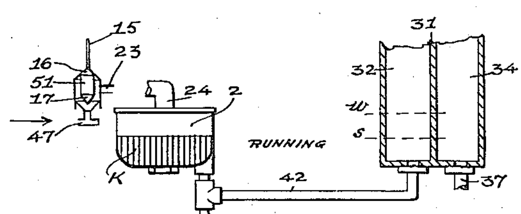

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN W. ANDERSON, JR., OF MISHAWAKA, INDIANA, ASSIGNOR TO THE ANDERSON COMPANY, OF SOUTH BEND, INDIANA, A CORPORATION OF INDIANA.

SYSTEM OF AUTOMATIC FUEL AND MOTOR CONTROL.

Application filed March 1, 1918. Serial No. 219,912.

To all whom it may concern:

Be it known that I, JOHN W. ANDERSON, Jr., citizen of the United States, residing at Mishawaka, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Systems of Automatic Fuel and Motor Control, of which the following is a specification.

My invention relates to a system of automatic fuel and motor control and it more especially consists of the features pointed out in the annexed claims.

The purpose of my invention is to provide an automatic fuel control that avoids the use of pumps or moving mechanism for removing kerosene or heavy fuel from the carbureter and replace the same with gasoline to facilitate starting; that is simple and direct acting; that automatically adapts itself to varying weather conditions; that positively removes the kerosene from the carbureter on stopping the engine and fills the carbureter bowl with gasoline; that stops the supply of gasoline and returns the removed kerosene to the carbureter bowl after the engine is running; and that continues to feed kerosene from the main supply as long as the engine is in operation. The interchange of fuel is effected without manual manipulation of any kind whatever except in the case of engine disorder when the kerosene may be entirely removed from the bowl and control chamber by opening a drain valve so that no modified gasoline will remain in the bowl.

With these and other related ends in view I illustrate in the accompanying drawings such instances of adaptation as will disclose the broad underlying principle without limiting myself to the specific details shown.

Fig. 1 is a side elevation of an instance of adaptation showing the approximate relation of the several parts.

Fig. 2 is an enlarged elevation partly in section of a diaphragm controlled fuel valve.

Fig. 3 is a diagrammatic view showing the relative position of parts, etc., when the engine is at rest.

Fig. 4 is a similar diagrammatic view showing the changes due to the engine being in motion.

In practically carrying out my invention I may use numerous alternative expedients without departing from the spirit of my invention. Among such may be instanced the relation of parts exemplified in the drawings wherein a carbureter 1 of standard design is provided with the usual float bowl 2. It connects with the intake manifold 3 attached to the engine by crab bolts 5 which also serve to hold the exhaust manifold 4 in place.

A tank 6 of relatively small capacity supplies gasoline through pipe 26 and nipple 12 to the under half 11 below a diaphragm 13 that is supported between casings 10 and 11. The upper half 10 of this casing is connected by pipe 8 to the intake manifold 3 as shown in Fig. 1. If desired for purposes of repair, adjustment, etc., a valve 9 may be placed in this pipe so as to stop the vacuum action whenever needed. In regular operation this valve is of course left open.

The casing 11 forms a laterally enlarged chamber connected to valve tube 25. It has two ducts, one 23 leading to the inlet 24 of the bowl 2 and the other 21 leading from the kerosene tank 7 through pipe 28. In normal running conditions the suction of the intake acting through pipe 8 raises the diaphragm 13 against the action of compression spring 14 which draws the upper conical end 16 of the valve 51 against seat 18 by means of a valve stem 15. This shuts off the gasoline. At the same time by the same movement the lower conical end 17 of the valve 51 is raised from off the seat 19 making a free opening through the removable valve tube 20 from inlet 21 to outlet 23, causing kerosene to be fed to the bowl 2 instead of gasoline. A sealing or cap screw 22 closes against the valve tube 20 serving to hold the latter in its place. This tube has a central bore 46 and a lateral opening 47 also a circumferential groove 49 to form a continuous passageway from 21 to valve seat 19 in whatever angular position it may be placed. It is held against a shoulder 50 if it is intended to be non-adjustable. In such an event the necessary adjustment of the valve 51 and stem 15 would be made where stem 15 threads into a central enlargement of the diaphragm 13 as shown in Fig. 2. Otherwise the tube 20 would itself be threaded to allow of ready adjustment from below the valve, and also above by means of stem 15.

The gasoline supply pipe 26 and kerosene supply pipe 28 may have shut off valves respectively 27 and 29 located in such pipes to isolate either supply in case of such need arising. Similarly valves 36 and 43 may be used in testing or in case it is desired to isolate either function or completely shut it off for any reason whatever on account of repairs, etc., to prevent needless leakage, inconvenience, etc.

The bottom of bowl 2 has a drain valve 30 by means of which it can be emptied. From above this valve a pipe 42 leads to the bottom of a sealed-in air chamber 32. This chamber is separated from the heating chamber 34 by a lengthwise partition wall 31. The exit from the chamber 34 is through the auxiliary exhaust outlet 37 in which a valve 38 may be placed. This valve as well as valve 36 control the flow of exhaust gases through the chamber 34. If desired the valve 38 may be controlled by a magnet 39 which is connected from a suitable battery over circuit 40 to a thermostat 33 in the chamber 32. As the successful operation of my device is not dependent on the cooperation of the thermostat 33 its use is quite optional, in consequence, it is not claimed herein. Under normal working conditions the valve 38 is left entirely open in view of which my invention is not limited to its use. In Figs. 3 and 4 it is eliminated entirely. Under certain conditions it may be convenient to restrict the free outlet of exhaust gases from the chamber 34 by means of the valve 38 which may be closed more or less as desired.

The chambers 32 and 34 with partition wall 31 and the outer encircling walls are cast integral to form a single unit that has ears 45 by means of which it is secured to a pair of crab bolts 5 or it may be supported in any other manner that is found expedient. The chamber 34 is connected to the exhaust manifold 4 through pipe 35 and valve 36. The outlet 37 passes through engine pan 41 as shown on Fig. 1. In order to install the thermostat within the air chamber 32 a hand hole cover 44 is provided.

The operation of the system is extremely simple and automatic in every particular. While the engine is running the relation of parts shown in Fig. 4 is maintained so that kerosene is being fed continuously to the carbureter. The exhaust by-pass through chamber 34 keeps the air in chamber 32 expanded so as to hold the kerosene in the carbureter bowl 2 from being drawn away through pipe 42 until such time as the engine is stopped. There no longer being any exhaust the air in chamber 32 cools and forms enough of a vacuum to suck the kerosene from the bowl 2 into the lower end of the chamber as shown in Fig. 3 where it is held until the air is again heated by exhaust gases and the kerosene is returned to the bowl. As soon as the engine stops there is no longer a suction on the diaphragm 13 and spring 14 as previously stated, forces it down carrying with it valve stem 15 and valve 51 which separates valve 16 from seat 18 to form an open passageway for gasoline from beneath the diaphragm, through connections 23 and 24 to the bowl 2. The admission of fuel into the bowl from 24 is controlled by a float, not shown, well known in the art. This automatic supply of gasoline to the bowl when the engine stops practically simultaneous with the removal of kerosene therefrom insures a sufficient amount of the more readily volatilized fuel for restarting after each prolonged stop of the engine. The relation of the parts under stopping conditions is shown in Fig. 3 and the change under running conditions in Fig. 4.

It will be observed that the system is self compensatory—under variable weather conditions,—changes of humidity and atmospheric pressure as well as temperature, by reason of the fact that the air in chamber 32, in cold weather, will contract more, thus drawing more kerosene mixed with some gasoline into this chamber. This provides a surplus of gasoline to that found in bowl 2 all of which is available for restarting the engine, thus making the operation automatically adapt itself to atmospheric changes.

The valve 36 may be electrically operated by a magnet similar to 39 instead of so controlling the valve 38. If for any reason a successful start, through motor disorder, is not made with the initial supply of gasoline in bowl 2, the drain valve 30 may be opened to remove any remnant of kerosene so that unmodified gasoline will alone be present on which to start the engine.

The dotted lines marked "Winter" and "Summer" in Fig. 1 are assumed positions of fuel levels for these seasonal conditions. It is also to be noted that a certain amount of commingling of gasoline and kerosene takes place in pipe 42 and chamber 32 which except in cases of extreme motor disorder will have cooperative advantages because the first change over to kerosene will be more gradual than otherwise.

It will be seen that the invention is extremely simple, economical to construct, easy to install and devoid of complexity in operation. It is of commanding importance and it covers any form of alternative elements on the broadest permissible basis.

What I claim is,

1. In a fuel and motor control system, an internal combustion engine, an intake and exhaust manifold connected thereto, a carbureter serving the intake manifold,

separate sources of different fuels, a fuel valve controlled by the suction within the intake manifold adapted to shut off the lighter fuel and simultaneously supply a heavier fuel to the carbureter, a by-pass from the exhaust manifold comprising an enlarged heating chamber, a sealed-in air chamber separated from the heating chamber by a division wall, and an open connection from the air chamber to the carbureter whereby on the contraction of the air in such chamber fuel will be withdrawn from the carbureter into said chamber and on the reexpansion of such air will be automatically returned to the carbureter, the removal and return of such fuel being substantially coordinated with each movement of the fuel valve.

2. In a fuel and motor control system a carbureter for supplying vaporized fuel to an intake manifold, an engine for utilizing such fuel, an exhaust manifold connected to the engine, separate fuel sources, means for directing fuel from either source to the carbureter, an air chamber in continuous open operative relation to the carbureter, means for regulating the heat of the chamber by the control of the exhaust fuel gases, and means for coordinating such control with the fuel supply whereby when the engine comes to rest kerosene is automatically withdrawn from the carbureter through the contraction of the air in the air chamber and gasoline substituted therefor in the carbureter the sequence of operation being such that the kerosene is returned to the carbureter on a resumption of engine speed through the reexpansion of the air in the air chamber and this fuel is thereafter continued instead of gasoline so long as the engine is active.

3. In a fuel and motor control system, an internal combustion engine having exhaust and intake manifolds, a standard carbureter, a source of gasoline, a source of kerosene, a valve common to both sources and adapted to control the flow of fuel from either source to the carbureter, means for controlling the operation of the valve in one direction by the vacuum developed in the intake manifold, to shut off the flow of gasoline and permit kerosene to be delivered instead, a spring adapted to produce the opposite effect on the valve, a heating chamber, a connection therefrom to the exhaust manifold, means for controlling heat flow therethrough, a sealed-in air chamber one wall of which also forms a wall of the heating chamber, an open connection from the air chamber to the carbureter, and means adapted to coordinate the expansion and contraction of the air in the air chamber with the flow of gasoline or kerosene through the stopping or running of the engine, whereby as the engine stops kerosene will be removed from the carbureter and gasoline substituted and when the engine is in motion the kerosene is returned to the carbureter which then continues to supply such fuel to the engine instead of gasoline.

4. In a fuel and motor control system a carbureter having a fuel bowl adapted to supply an internal combustion engine, means for feeding either gasoline or kerosene to the carbureter, an air chamber in open connection with the fuel bowl, and means for automatically contracting and expanding the air in said chamber in alternate sequence whereby fuel may be removed and returned to the bowl at recurrent intervals dependent on the operation or non-operation of the engine.

5. In a fuel and motor control system an internal combustion engine, a fuel supply controlled by the suction of the engine, a carbureter placed between such control and the engine, and automatic means adapted to remove fuel from the carbureter and subsequently return the same thereto dependent on the variation of temperature of the engine exhaust.

In testimony whereof I affix my signature.

JOHN W. ANDERSON, Jr.